CLAIMS

What is claimed is:

1. A method for treating congestive heart failure, comprising:

providing a first stimulator that generates an infusion pulse in accordance with prescribed parameters;

providing a catheter connected to the first stimulator, which catheter includes a discharge portion;

providing a second stimulator that generates an electrical pulse in accordance with prescribed parameters;

providing a lead connected to the second stimulator, which lead includes at least one electrode;

implanting the catheter discharge portion and the at least one electrode near at least one cardiac tissue to be stimulated;

implanting the first stimulator and the second stimulator at a location remote from the at least one tissue to be stimulated;

tunneling the catheter subcutaneously to the first stimulator location;

delivering via the first stimulator and catheter, infusion pulses of at least one drug as at least one treatment for congestive heart failure to the at least one cardiac tissue, which tissue comprises at least one of a coronary artery, a branch of a coronary artery, a coronary vein, a branch of a coronary vein, the aorta, the left ventricle, the right ventricle, the left atrium, the right atrium, a pulmonary vein, and a pulmonary artery; and

delivering via the second stimulator and lead, at least one electrical stimulating pulse to tissue surrounding the at least one electrode.

2. The method of Claim 1 where the first stimulator and the second stimulator are one stimulator.

3. The method of Claim 1 wherein the at least one electrical stimulating pulse is a defibrillation pulse.

4. The method of Claim 3 further comprising infusing an antiarrhythmic agent.

5. The method of Claim 1 wherein the drug comprises at least one of nitroglycerin, nitroprusside, nitric oxide, a nitric oxide donor, adenosine, a loop diuretic, a vasopressin antagonist, an ACE inhibitor, and Angiotensin II receptor antagonist, hydralazine, isosorbide dinitrate, isosorbide mononitrate, amyl nitrite, a calcium-channel blocker, digitalis, digoxin, an inotropic agent, a diuretic, a beta-blocker, an antithrombotic agent, an antiarrhythmic agent, an antihyperlipidemic agent, ipratropium, theophylline, a vasopressin antagonist, an agent to block TNF production, a TNF antagonist, atrial natriuretic peptide (ANP), brain natriuretic peptide (BNP), a neutral endopeptidase (NEP) antagonist, an endothelin receptor antagonist, niacin, prostacyclin, an aldosterone antagonist, an agent promoting SERCA2a activity, an adeno associated virus carrying a phospholamban gene, and an adenovirus carrying a SERCA2a gene.

6. The method according to Claim 1 wherein the at least one drug provides acute treatment on demand with at least one of nitroglycerin, nitroprusside, nitric oxide, a nitric oxide donor, adenosine, a loop diuretic, an antiarrhythmic agent, an antithrombotic agent, and a vasopressin antagonist.

7. The method according to Claim 1 wherein the at least one drug provides chronic treatment delivered at a basal rate or via periodic bolus of at least one of an ACE inhibitor, and Angiotensin II receptor antagonist, hydralazine, isosorbide dinitrate, isosorbide mononitrate, amyl nitrite, nitric oxide, a nitric oxide donor, a calcium-channel blocker, digitalis, digoxin, an inotropic agent, a diuretic, a beta-blocker, an antithrombotic agent, an antiarrhythmic agent, an antihyperlipidemic agent, ipratropium, theophylline, a vasopressin antagonist, an agent to block TNF production, a TNF antagonist, atrial natriuretic peptide (ANP), brain natriuretic peptide (BNP), a neutral endopeptidase (NEP) antagonist, an endothelin receptor antagonist, niacin, prostacyclin, and an aldosterone antagonist.

8. The method according to Claim 1 wherein the at least one drug improves myocyte calcium handling.

9. The method according to Claim 8 wherein the drug is at least one agent that increases the activity of sarcoplasmic reticulum Ca(2+) ATPase (SERCA2a) activity.

10. The method according to Claim 9 wherein the drug is at least one of an adenovirus carrying a SERCA2a gene and an adeno associated virus carrying a phospholamban gene.

11. The method of Claim 1 further comprising providing at least one sensor to sense a physical condition, and adjusting the parameters based on the sensed condition.

12. A method for treating chronic heart failure (CHF), comprising:

implanting a fully implantable stimulator system for generating stimulating pulses;

administering via the stimulator system stimulating pulses of at least one acute CHF drug;

administering via the stimulator system stimulating pulses of at least one chronic CHF drug; and

administering via the stimulator system stimulating pulses of at least one drug that reverses CHF.

13. The method of Claim 12 wherein the at least one drug that reverses CHF comprises at least one of a drug that improves myocyte calcium handling, an agent that increases the activity of sarcoplasmic reticulum Ca(2+) ATPase (SERCA2a) activity, an adeno associated virus carrying a phospholamban gene, and an adenovirus carrying a SERCA2a gene.

14. The method of Claim 12 wherein the at least one drug provides acute treatment on demand with at least one of nitroglycerin, nitroprusside, nitric oxide, a nitric

oxide donor, adenosine, a loop diuretic, an antiarrhythmic agent, an antithrombotic agent, and a vasopressin antagonist.

15. The method of Claim 12 wherein the at least one drug provides chronic treatment delivered at a basal rate or via periodic bolus of at least one of an ACE inhibitor, and Angiotensin II receptor antagonist, hydralazine, isosorbide dinitrate, isosorbide mononitrate, amyl nitrite, nitric oxide, a nitric oxide donor, a calcium-channel blocker, digitalis, digoxin, an inotropic agent, a diuretic, a beta-blocker, an antithrombotic agent, an antiarrhythmic agent, an antihyperlipidemic agent, ipratropium, theophylline, a vasopressin antagonist, an agent to block TNF production, a TNF antagonist, atrial natriuretic peptide (ANP), brain natriuretic peptide (BNP), a neutral endopeptidase (NEP) antagonist, an endothelin receptor antagonist, niacin, prostacyclin, and an aldosterone antagonist.

16. The method of Claim 12 wherein the stimulating pulses are administered to at least one of a coronary artery, a branch of a coronary artery, a coronary vein, a branch of a coronary vein, the aorta, the left ventricle, the right ventricle, the left atrium, the right atrium, a pulmonary vein, and a pulmonary artery.

17. The method of Claim 12 further comprising administering electrical stimulation pulses to treat CHF.

18. The method of Claim 17 wherein at least one of the electrical stimulation pulses is a defibrillation pulse.